

4.15 Land Use

4.15.1 Introduction

Management of reservoir levels and releases affects land use at the shoreline; therefore, the analysis of land use impacts focused on shoreline development in the immediate vicinity of TVA shorelines. A total of 6,699.7 shoreline miles surround the nine mainstem reservoirs, and 4,307.9 shoreline miles surround the 26 tributary reservoirs included in the ROS. The land use analysis concentrated on residential development, the most prevalent developed land use around the reservoirs. The SMI (TVA 1998) identified three times as many miles of residentially developed shoreline as all other developed uses combined. Developed recreation (i.e., public facilities and commercial marinas) was a distant second. The residential land use category is expected to experience the majority of the growth during the ROS period of study. The SMI, which was developed to address growing concerns about the effects of increasing residential development over an ensuing 25-year period, also reflects this projection. The SMI projected¹ up to 38 percent, or 4,192 miles, of reservoir shoreline system wide was likely to be developed for residential uses, with each reservoir having its own development pattern and length of shoreline available for residential access.

Resource Issues

- Rate of residential shoreline development and resultant change in land use

The primary region of influence on land use extends 0.25 mile from the full-pool elevation around a particular reservoir. TVA is directly involved in implementing policies for shoreline development at the immediate waterfront shoreline. The 0.25-mile zone encompasses a typical waterfront residential subdivision. A secondary zone of influence extends outward 0.75 mile from the primary zone. Development within the primary and secondary zones often must also conform to certain federal, state, and local (county and municipal) development and environmental regulations.

Shoreline residential development is ongoing and will continue at some rate until complete buildout (the point at which the available shoreline property has been consumed by residential development). The SMI anticipated that buildout would occur by 2023. Through reservoir-specific, land management planning efforts and TVA management practices, TVA has defined the amount and location of shoreline property available for residential development. The primary effect of alternative reservoir operation policies on land use would be the rate of shoreline residential development (i.e., buildout would be likely to occur sooner or later than projected by the SMI) in the ROS.

Identified changes to TVA's operations policy would not materially change operation of any run-of-river reservoir and certain storage reservoirs. Therefore, two mainstem reservoirs (Wilson and Nickajack) and 11 tributary reservoirs (Melton Hill; Fort Patrick Henry; Wilbur; Apalachia; Ocoee #1, #2, and #3; Upper Bear Creek; Bear Creek; Little Bear Creek; and Cedar Creek)

¹ Actual buildout is expected to be less than 38 percent because of environmental review, maintaining and gaining exchanges, and the shoreline classification process required by the SMP.

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were not considered in the land use analysis. Also not considered are three projects with no available shoreline for residential development.

4.15.2 Regulatory Programs and TVA Management Activities

Shoreline development along TVA reservoirs is managed in accordance with the Shoreline Management Policy (SMP); TVA Land Management Plans (LMPs) for individual reservoirs; and applicable federal, state, county, and municipal regulations. In addition to its reservoir land management planning, TVA manages reservoir shoreline development through the Section 26a permit, which regulates the construction of shoreline structures. TVA does not otherwise regulate private property, except as specifically provided for in individual property flowage easements or in deeds where TVA sold property but retained rights to protect flood control interests and manage certain construction activities. Flowage easements vary widely among reservoirs and provide TVA with varying levels of control over construction on and use of flowage easement shorelands.

Section 26a

Section 26a of the TVA Act requires that TVA approve the construction, operation, and maintenance of any obstruction affecting navigation, flood control, or public lands—across, along, or in the Tennessee River or its tributaries—even when TVA has no land rights involved. TVA is charged with administering and ensuring compliance with Section 26a regulations and reviews more than 2,000 permit applications each year.

Since the early 1970s, a number of environmental laws have been enacted that indirectly affect implementation of Section 26a, including NEPA, the Archaeological and Historic Preservation Act (AHPA), and the ESA. These statutes require TVA to evaluate the environmental impacts of proposed actions; for major projects, preparation of an EIS may be required for Section 26a approval. This process leads to approval, denial, or revision of proposed project plans in order to avoid adverse environmental impacts. Once approved, permit recipients are required to follow the construction procedures and environmental protection measures specified. Coupled with these and other environmental requirements, Section 26a ensures that development along the Tennessee River and its tributaries receives adequate planning and review. The SMI indicated that 85 percent or more of all Section 26a permit approvals were for structures directly associated with shoreline residential property, such as private docks, piers, and boathouses.

Shoreline Management Initiative

In the 1990s, TVA recognized the growing public concern for potential effects on reservoir shoreline resources due to increasing shoreline residential development. In response, TVA developed and implemented the SMI (also see Section 1.8), to better protect shoreline and aquatic resources while allowing adjacent residents reasonable access to the water. Access rights to the water determine the geographical pattern for residential development around specific reservoirs. In areas designated by the SMI as closed to new residential access, the SMI does not allow private water use facilities unless a proposal to relinquish water access

rights elsewhere was presented to TVA, and TVA determined that net public and environmental benefits would result from the change. Specific standards for facility size and vegetation management were established in the SMI. The SMI also established a shoreline classification system wherein shoreline environmental constraints would be identified and appropriate management strategies implemented. TVA reviews proposals to open up new shorelines for residential development under the SMI criteria. The management of the shoreline on each TVA reservoir is addressed in detail by an LMP.

Land Management Plans

Through the Section 26a permitting process, TVA has some control over the types and extent of shoreline development. TVA also manages shoreline development through its land management planning process. The SMI defined the policy that sets the parameters and process for future residential access to the waters of TVA-managed reservoirs. Eleven Watershed Teams are responsible for the implementation of shoreline management, through both Section 26a and the SMP that was created by the SMI. In addition to other responsibilities, these teams oversee and coordinate the land use planning and management of one or more TVA reservoirs within a defined watershed.

Land Management Plans are a responsibility of each Watershed Team. In 1979, TVA initiated a comprehensive planning process to define allocations for its multipurpose reservoir lands. Established LMPs are being revised to be consistent with the Shoreline Management Policy. Watershed Teams are responsible for preparing or revising reservoir-specific LMPs. Each LMP includes an Environmental Assessment or EIS, and involves extensive interagency and public review. Land Management Plans define allowable development for recreational, commercial, residential access, and industrial uses along TVA shorelines.

Other Regulations

Certain federal, state, county, and municipal regulations control the development of private property both inside and outside the 0.25-mile primary zone of influence. The state, county, and municipal regulations vary widely in their applicability and effectiveness in mitigating shoreline development impacts.

4.15.3 Shoreline Residential Development

Existing Conditions

Landsat imagery provided the most recent (ca. 1992) record of land use for the TVA reservoir system. A simplified, standard USGS land use classification was applied to the primary zone of influence for all reservoirs. Simplification of the classification system was accomplished by merging certain open space cover types that would be likely to undergo similar impacts from development (Table 4.15-01).

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Table 4.15-01 The USGS Land-Use Classification System, as Simplified

• Open water
• Low-intensity residential
• High-intensity residential
• Commercial/industrial/transportation
• Bare rock/sand/clay
• Forest
• Pasture/hay
• Cropland (row crops)
• Urban/recreational grasses (e.g., close-mown parkland open space, playing fields, large-lot lawns)
• Wetlands

The number of acres available for shoreline residential development and the respective percentage of cover type (predominantly forested) were calculated for each reservoir, as shown in Table 4.15-02. For the reservoirs included in the land use analysis, Table 4.15-02 includes the shoreline type; total shoreline miles; total shoreline miles available for residential development; miles and percent of total shoreline miles that are developed; miles, percent of available shorelines, and acres of undeveloped shoreline; residentially developable open space by cover type; and the projected 1990s development rate.

Section 26a permit approvals involve approximately 60 different types of activities for which TVA exercises jurisdiction. Within that group, 16 of the items clearly reflect private residential activity. Items identified include a variety of boat slips, boathouses, and dock/piers, as well as activities without structures, such as landscaping/minor clearing and vegetation management plans. Two reservoirs, Norris and Pickwick, have electronically retrievable Section 26a permit data from 1936 and 1949, respectively. These data were available for analysis to determine whether there was a discernible change in permit activity coincident with a change in the reservoir operations policy (Figure 4.15-01).

The Lake Improvement Plan forecasts the 1990s development of private shorelands around TVA reservoirs in terms of low, medium, and high growth rates. Those projections are identified in Table 4.15-02. TVA land management specialists reviewed certain reservoir forecasts and confirmed that the majority was accurate.

Shoreline residential development is projected to reach full buildout at some future time, irrespective of any changes TVA makes in its reservoir operations policy. The SMI estimated that full residential buildout would be achieved in approximately 25 years. The ROS examines

the potential for changes in the rate of shoreline residential development brought about by proposed reservoir operation alternatives and the resulting impacts.

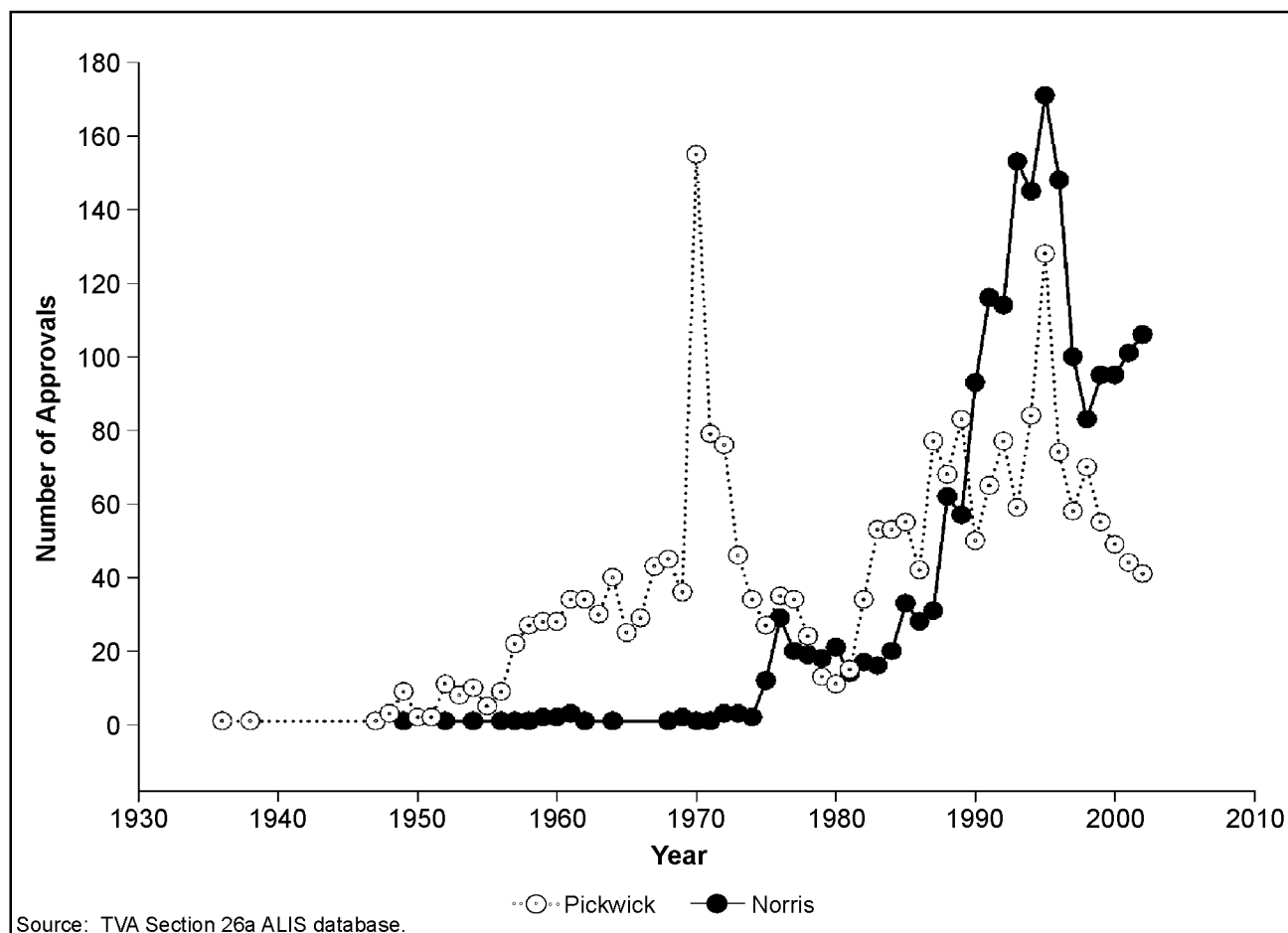


Figure 4.15-01 Section 26a Permit Approvals of Structures Related to Shoreline Recreation at Norris and Pickwick Reservoirs

Table 4.15-02 Shoreline Development for Reservoirs Considered in the Land Use Analysis

Reservoir	Type ¹	Total Shoreline Type ¹ (miles) ²	Shoreline Available for Residential Development		Developed Shoreline				Undeveloped Residential Shoreline			Developable Open Space by Cover Type			Projected Development Rate
			Miles	% of Total	Residential		Other		Miles	% of Available	Acres	Forest (%)	Pasture (%)	Crop (%)	
					Miles	% of Total	Miles	% of Total							
Mainstem Reservoirs															
Kentucky	MS	2,064.3	936.9	45.4	120.5	5.8	47	2.3	816.4	87.1	130,624	81	3	5	Medium
Pickwick	MS	490.6	118.3	24.1	63.7	13.0	27.8	5.7	54.6	46.2	8,736	82	6	6	High (low last 3 years)
Wheeler	MS	1,027.2	165.4	16.1	59.7	5.8	28.2	2.7	105.7	63.9	16,912	58	17	18	Medium
Guntersville	MS	889.1	113.3	12.7	87.3	9.8	83.2	9.4	26.0	22.9	4,160	71	8	7	Medium
Chickamauga	MS	783.7	248.7	31.7	88.7	11.3	21.6	2.8	160.0	64.3	25,600	71	10	4	Medium
Watts Bar	MS	721.7	340.4	47.2	141.8	19.6	17.4	2.4	198.6	58.3	31,776	83	9	2	Medium
Fort Loudon	MS	378.2	317.2	83.9	184.8	48.9	13.8	3.6	132.4	41.7	21,184	68	20	4	High
Subtotal		6,354.8	2,240.2	35.3	746.5	11.7	239.0	3.8	1,493.7	66.7	238,992	—	—	—	
Tributary Reservoirs															
Norris	TS	809.2	360.8	44.6	91.0	11.2	16.0	2.0	269.8	74.8	43,168	93	4	1	Medium
Douglas	TS	512.5	454.9	88.8	78.1	15.2	8.3	1.6	376.8	82.8	60,288	74	14	5	Medium
South Holston	TS	181.9	48.2	26.5	18.1	10.0	6.9	3.8	30.1	62.4	4,816	82	12	3	Medium
Boone	TS	126.6	102.6	81.0	64.3	50.8	2.8	2.2	38.3	37.3	6,128	63	22	6	Medium
Cherokee	TS	394.5	172.3	43.7	59.9	15.2	38.1	9.7	112.4	65.2	17,984	72	18	6	Medium

Table 4.15-02 Shoreline Development for Reservoirs Considered in the Land Use Analysis (continued)

Reservoir	Type ¹	Total Shoreline (miles) ²	Shoreline Available for Residential Development		Developed Shoreline				Undeveloped Residential Shoreline				Developable Open Space by Cover Type			Projected Development Rate
			Miles	% of Total	Residential		Other		Miles	% of Available	Acres	Forest (%)	Pasture (%)	Crop (%)		
					Miles	% of Total	Miles	% of Total								
Watauga	TS	104.9	50.2	47.9	19.4	18.5	2.9	2.8	30.8	61.4	4,928	91	5	1	Medium	
Fontana	TS	237.8	19.3	8.1	2.6	1.1	45.0	18.9	16.7	86.5	2,672	97	0	0	Low	
Tellico	TS	357.0	110.4	30.9	19.7	5.5	5.8	1.6	90.7	82.2	14,512	84	11	4	High	
Chatuge	TS	128.0	79.6	62.2	52.1	40.7	2.3	1.8	27.5	34.5	4,400	79	16	2	High	
Nottely	TS	102.1	58.8	57.6	25.9	25.4	2.6	2.5	32.9	56.0	5,264	88	8	1	High	
Hiwassee	TS	164.8	20.3	12.3	12.0	7.3	0.8	0.5	8.3	40.9	1,328	94	1	1	Medium	
Blue Ridge	TS	68.1	26.0	38.2	15.5	22.8	1.8	2.6	10.5	40.4	1,680	97	1	0	Medium	
Tims Ford	TS	308.7	47.7	15.5	43.2	14.0	15.3	5.0	4.5	9.4	720	61	16	13	High	
Normandy	TS	75.1	11.2	14.9	0.0	0.0	4.6	6.1	11.2	100.0	1,792	89	8	2	Low	
Great Falls ²	TS	120.0	—	—	—	—	—	—	—	—	—	—	—	—	—	
Subtotal		3,571.2	1,562.3	43.7	501.8	14.1	153.2	4.3	1,060.5	67.9	169,680	—	—	—	—	

¹ MS = Mainstem storage; TS = Tributary storage.

² Great Falls does not come under the Shoreline Management Policy.

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Reservoir Characteristics

The reservoirs considered in this study have widely varying amounts of developable shoreline, making it difficult to make broad generalizations about them. Some reservoirs have a certain attractiveness that others do not—such as proximity to urban centers and a well-developed transportation infrastructure—and those reservoirs are likely to reach buildout sooner. Some reservoir characteristics (Appendix A, Tennessee River and Reservoir System Operation and Planning Review FEIS 1990) that are regarded as positive factors in the growth of shoreline residential development would be good infrastructure, good recreation, and good shoreline access. Conversely, some reservoir characteristics that are regarded as negative factors or detractors to residential development would be remoteness, lack of developed infrastructure, and poor shoreline access.

The residential development of shorelines also influences the development of “backlands,” those parcels adjacent to shoreline parcels, within the 0.75-mile band that surrounds the 0.25-mile shoreline band. In time, increased shoreline development will stimulate expansion of the support service industries nearby (i.e., gasoline stations, supermarkets, restaurants, and motels).

The proposed changes in reservoir operations policy could potentially alter the relative attractiveness of certain reservoirs by changing the recreational and aesthetic appeal to the real estate buying public. This study will attempt to explain the relative impact the ROS alternatives could have on current shoreline residential development.

Factors Affecting the Rate of Shoreline Residential Development

The rate of shoreline residential development within the 0.25-mile shoreline band during the estimated period to full buildout (2023) is affected to a large degree by a number of external factors, such as the general state of the economy, growth in the TVA region, attractiveness of mortgage rates, proximity to urban areas, transportation infrastructure and accessibility, and real estate marketing efforts. As mentioned in Section 4.15.5, factors like well-developed infrastructure, good shoreline access, and commercial recreational opportunities play a key role in the pattern of residential development.

Proximity to urban areas has also been identified as a contributor to residential development at certain reservoirs. The discussion of population in the SMI recognized that growth has not been uniform throughout the TVA region and that urbanization trends have affected certain counties more than others. The Southern Forest Resource Assessment (SFRA) (USDA 2002) concluded that one of the forces strongly influencing land use changes is “urbanization, driven by population and general economic growth.” Two of the areas identified in the SFRA as experiencing urbanization are Nashville and Knoxville.

Real estate investment has held or increased its value during the most recent recession. Over the past 3 years, the value of real estate investment trusts (REITS) has risen synchronously with the fall in value of the S&P 500 index (Morningstar 2003). The rise of investor interest in

real estate, despite the current economic recession, correlates with a general decline in both fixed- and variable-rate mortgages over the same period (HSH Associates 2003). The market for second homes in the United States is showing a lot of activity (Fogarty 2002) and although it is not a primary driver in TVA reservoir residential development (only 20 percent, according to the SMI [TVA 1998]), it is a contributor.

The relationship between proximity to the reservoirs, their operating characteristics, and higher property values is documented in the literature. Studies indicate that there is a measurable difference in home values between shoreline and non-shoreline properties (see Section 5.25.3.5).

Future Trends

During the 1980s, the population of the TVA region increased by 5.7 percent—adding more than 42,000 people annually—to a level of 7,937,330 residents by 1990. The regional population increase was lower than across the United States as a whole, which increased 9.8 percent over the same time period. Between 1990 and 2000, the population of the TVA region increased at a rate greater than the United States—averaging over 120,000 residents annually—to a level of 9,153,412 residents. This represents an increase in the regional population of 15.3 percent, compared to the 13.1 percent population growth of the United States over the same time period.

In both decades, Nashville had the largest population growth across TVA sub-regions. The sub-regions of Chattanooga and Knoxville also contributed to the increased growth rate in the 1990s.

The projected increase in population of the TVA region follows the trend of the last decade, whereby it will exceed that of the United States. Over the 27-year period, the population of the TVA region is forecast to rise to 12,476,306—representing an increase of 30.0 percent—compared to the projected increase in the national population of 28.2 percent over the same time period. The projected population boom in Nashville and Knoxville are expected to be the significant contributors to this population increase.

The SMI indicated that both public use of reservoirs and shoreline residential development has continued to increase. Section 26a permits for residential types of structures and modifications reflect shoreline residential development, and the SMI analysis of Section 26a permits revealed an increase of approximately 6 percent per year.

While changes to the existing reservoir operations policy may affect the attractiveness of certain reservoirs during certain times of the year, TVA's stewardship role and its reservoir operations policy are not the primary determining factor for the rate of shoreline residential development over time.

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